

Wrought Magnesium Alloy/Process Development

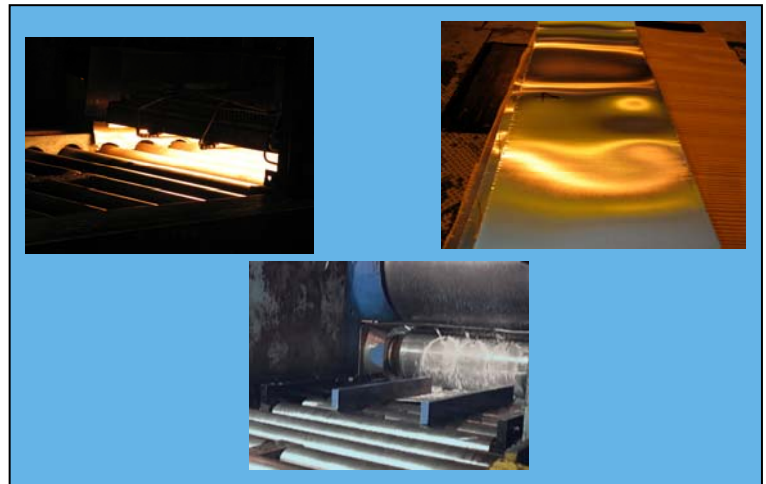
Background

Magnesium is 38% lighter than aluminum. Over the last decade the cost of magnesium metal has generally been about \$1.50 per pound, about twice that of aluminum. Although the cost of magnesium has decreased recently, wrought magnesium sheet is still expensive largely due to the number of rolling and 24 hour anneals involved to make sheet out of ingots.

Infrared processing in which a bank of infrared lamps is used to quickly heat and anneal the material should substantially reduce costs by allowing a continuous or near continuous process. So instead of annealing a giant coil overnight in a large furnace, infrared lamps could be installed directly on rolling mills. Magnesium is a good candidate for this process because it has good thermal conductivity and a low melting point resulting in a low annealing temperature.

The Technology

Laboratory scale tests were performed both with a plasma arc lamp and with quartz halogen lamps. These tests showed that quick anneals ranging from seconds for the plasma arc lamp to minutes for infrared quartz lamps were equivalent to a one-hour furnace anneal. Grain size was uniform through the thickness and mechanical



Infrared rolling of magnesium sheet at a commercial mill

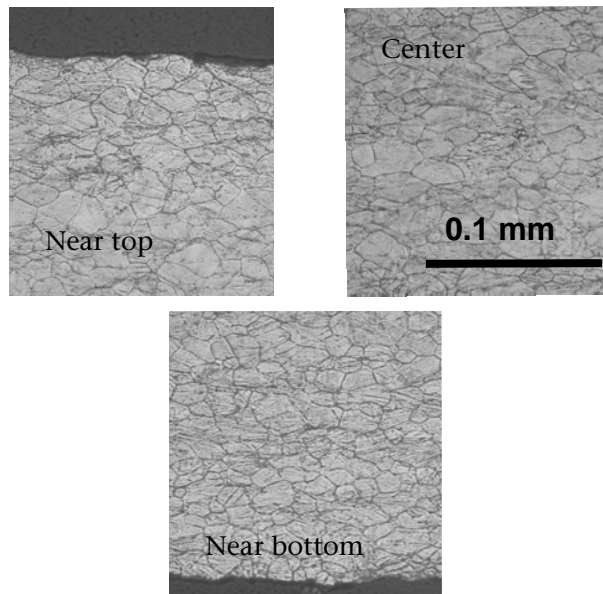
Benefits

- Reducing the costs of sheet magnesium alloys will encourage their use in transportation applications that will eventually lead to:
 - Reduced vehicle weight
 - Increased fuel efficiency
 - Reduced emissions

properties were similar to normally processed metal. A successful demonstration run was made of a commercial rolling mill with a bank of infrared lamps with an output of 12 watts/cm.² Future efforts will lead to incorporating this technology with continuous twin roll casting to further reduce costs.

Commercialization

Commercialization of this technology started by performing a demonstration at a commercial rolling mill, Manufacturing Sciences, Inc., in Oak Ridge, Tennessee. ORNL is continuing to work with industrial partners to identify opportunities for demonstrating the technology for large scale production of sheet in a commercial setting.



Optical photos, side view



Where Can I Find More Information?

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Printed on recycled paper

March 2005